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METHOD AND APPARATUS FOR MANAGING FUNCTIONS IN A CAMERA PHONE

BACKGROUND OF THE INVENTION

1. Technical Field:

The present invention relates generally to an improved data processing system and in particular, to a method and apparatus for controlling functions in a camera phone. Still more particularly, the present invention relates to a method, apparatus, and computer instructions for managing camera functions in a camera phone.

2. Description of Related Art:

Mobile phones have become commonplace in society. These phones allow for a user to have greater mobility, while staying in communication with others. With the emergence of mobile phones with built-in digital cameras or add-on camera modules, such a phone can send a picture taken using the camera over a wireless network to many recipients. These types of devices are referred to as "camera phones". This combination of phone and camera features has provided large appeal to consumers. For example, most people carry mobile phones, but leave their digital cameras at home. With the combined functionality in a single unit, users are unlikely to miss various photographic moments.

Additionally, with camera phones, images may be associated with entries in a phone book. As a result,

when someone calls a user, a picture of the caller may be seen in addition to just the name. Although a camera phone is primarily a phone and will not replace the digital camera, these features have made this new hybrid device very popular. One example of a camera phone is the Nokia 3650, available from Nokia Corporation.

The growing popularity of camera phones has created a new hidden security risk. With the widespread acceptance of mobile phones, people are accustomed to seeing them in use. However, many secure areas are present that allow mobile phones, but not cameras. For example, concerts and dressing rooms are places typically in which cameras are not allowed, but mobile phones are allowed. People using these camera phones have a greater ability to take unauthorized pictures in these secure or private areas because people do not always recognize when camera functions on a camera phone are being used. In many cases, camera phones have been banned in secure areas even though mobile phones are allowed. As a result, users with mobile phones without camera features are able to bring in and use those devices, while those with the camera features are not able to bring in their devices. Having to leave behind camera phones is an inconvenience for camera phone owners, leaving them without a communications device.

Therefore, it would be advantageous to have an improved method and apparatus to control the use of camera phones in secure areas.

SUMMARY OF THE INVENTION

The present invention provides a method, apparatus, and computer instructions for managing a camera in a mobile communications unit. A location of the mobile communications unit in a selected area is determined. Depending on the location of the mobile communications unit, a signal is sent which causes at least one camera function in the mobile communications unit to be limited or disabled.

BRIEF DESCRIPTION OF THE DRAWINGS

The novel features believed characteristic of the invention are set forth in the appended claims. The invention itself, however, as well as a preferred mode of use, further objectives and advantages thereof, will best be understood by reference to the following detailed description of an illustrative embodiment when read in conjunction with the accompanying drawings, wherein:

Figure 1 is a diagram of a distributed data processing system in which the present invention may be implemented;

Figure 2 is a block diagram of a camera phone in accordance with a preferred embodiment of the present invention;

Figure 3 is a block diagram of a data processing system that may be implemented as a server in accordance with a preferred embodiment of the present invention;

Figure 4 is a block diagram illustrating components used in managing the operation camera functions in a camera phone in accordance with a preferred embodiment of the present invention;

Figure 5 is a flowchart of a process for managing camera functions in a camera phone in accordance with a preferred embodiment of the present invention;

Figure 6 is a flowchart of a process for sending picture information to a mobile communications unit in accordance with a preferred embodiment of the present invention;

Figure 7 is a flowchart of a process for sending pictures to a mobile communications unit in accordance with a preferred embodiment of the present invention;

Figure 8 is a flowchart of a process for disabling camera functions in accordance with a preferred embodiment of the present invention;

Figure 9 is a flowchart of a process for handling camera functions in a camera phone in accordance with a preferred embodiment of the present invention;

Figure 10 is a flowchart of a process for receiving picture information in accordance with a preferred embodiment of the present invention; and

Figure 11 is a flowchart of a process for receiving pictures in a secure area in accordance with a preferred embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

With reference now to the figures and in particular with reference to **Figure 1**, a diagram of a distributed data processing system is shown in which the present invention may be implemented. In this example, distributed network data processing system **100** includes network **102** and wireless network **104**. These networks provide the medium used to provide communications links between various devices and computers connected together within network data processing system **100**. Network **102** may be implemented using various types of networks, such as, for example, a local area network (LAN), a wide area network (WAN), an Intranet, the Internet, or some combination of these types of networks. In these examples, the different networks and gateways within network **102** use transmission control protocol/Internet protocol (TCP/IP) suite of protocols to communicate with one another.

Wireless network **104** is a wireless network typically used for voice communications between mobile communications units, such as cell phones. The access protocol used in wireless network **104** may take various forms, such as, for example, time division multiple access (TDMA) and code division multiple access (CDMA). These are protocols typically used for forced communications to allow for communication between mobile communications units, such as mobile communications units **106**, **108**, and **110**. In this example, server **112** is connected to network **102** and is an example of a component

in which an illustrative embodiment of the present invention may be implemented. In particular, server **112** may send or initiate the sending of commands to mobile communications units **106**, **108**, and **110** to limit or disable various functions in these mobile communications units. In particular, in these examples, these functions are camera functions. These mobile communications units are camera phones including an integrated or attached camera.

Turning next to **Figure 2**, a block diagram of a camera phone is depicted in accordance with a preferred embodiment of the present invention. Camera phone **200** includes baseband processor **202,** application processor **204**, flash/static random access memory (SRAM) **206**, flash card **208**, radio frequency integrated circuit (RFIC) **210**, radio frequency (RF) module **212**, antenna **214**, Blue Tooth unit **216**, color liquid crystal display (LCD) **218**, camera **220**, and IC card **222**.

Baseband processor **202** provides for receiver and transmitter operations and is also referred to as a transceiver. In particular, baseband processor **202** handles all of the audio, signal, and data processing needed to receive and send data using RF transmissions or Blue Tooth transmissions. Application processor **204** provides the processing power for other functions within camera phone **200**. For example, calculators, calendars, alarms, camera functions, and directories are provided through application processor **204**. Flash/SRAM **206** is a storage device in which various instructions for providing the functions within camera phone **200** are

located and provide upgrades. Flash card **208** is a storage device in which user data and applications may be stored. An example of flash card **208** is a secure digital card.

A pathway for the transmission of voice and other types of data is through RFIC **210**. Additionally, short range transmissions may be sent or received through Blue Tooth unit **216**. Blue Tooth unit **216** conforms to Blue Tooth wireless specification, which defines the link layer and application layer for product developers. Both of these transmissions are made through antenna **214** in this illustrative example.

Color LCD **218** provides a display for pictures and other data for camera phone **200**. Camera **220**, in this example, is a complementary metal oxide semiconductor (CMOS) camera which may be built into camera phone **200** or connected to camera phone **200** as a module, such as IC card **222**. IC card **222** also may contain other application specific functions, such as a global positioning system (GPS) or other functions, such as a modem or additional memory.

Camera **220** forms the camera module of camera phone **200**, while the other components form the digital phone module of camera phone **200** in these illustrative examples. Instructions or circuits are added to camera phone **200** to allow for control of the digital camera and allow limitations to camera functions according to a preferred embodiment of the present invention.

Referring to **Figure 3**, a block diagram of a data processing system that may be implemented as a server is

depicted in accordance with a preferred embodiment of the present invention. Data processing system **300** may be a symmetric multiprocessor (SMP) system including a plurality of processors **302** and **304** connected to system bus **306**. Alternatively, a single processor system may be employed. Also connected to system bus **306** is memory controller/cache **308**, which provides an interface to local memory **309**. I/O bus bridge **310** is connected to system bus **306** and provides an interface to I/O bus **312**. Memory controller/cache **308** and I/O bus bridge **310** may be integrated as depicted.

Peripheral component interconnect (PCI) bus bridge **314** connected to I/O bus **312** provides an interface to PCI local bus **316**. A number of modems may be connected to PCI local bus **316**. Typical PCI bus implementations will support four PCI expansion slots or add-in connectors. Communications links to mobile communications units **106-110** in **Figure 1** may be provided through modem **318** and network adapter **320** connected to PCI local bus **316** through add-in boards.

Additional PCI bus bridges **322** and **324** provide interfaces for additional PCI local buses **326** and **328**, from which additional modems or network adapters may be supported. In this manner, data processing system **300** allows connections to multiple network computers. A memory-mapped graphics adapter **330** and hard disk **332** may also be connected to I/O bus **312** as depicted, either directly or indirectly.

Those of ordinary skill in the art will appreciate that the hardware depicted in **Figur 3** may vary. For

example, other peripheral devices, such as optical disk drives and the like, also may be used in addition to or in place of the hardware depicted. The depicted example is not meant to imply architectural limitations with respect to the present invention.

The data processing system depicted in **Figure 3** may be, for example, an IBM eServer pSeries system, a product of International Business Machines Corporation in Armonk, New York, running the Advanced Interactive Executive (AIX) operating system or LINUX operating system.

Turning now to **Figure 4**, a block diagram illustrating components used in managing the operation of camera functions in a camera phone are depicted in accordance with a preferred embodiment of the present invention. In this example, area **400** is a secure area in which photography is prohibited or restricted. Area **400** may be, for example, a theater, a room, a stadium, or some other area. Although the shape of area **400** is rectangular in these examples, the shape may vary depending on the particular implementation.

Mobile communications units **402** and **404** are located within area **400,** while mobile communications unit **406** is outside of area **400**. In these examples, wireless transmission device **408** may be used to transmit signals to limit the camera functions of mobile communications units **402** and **404**, while allowing the telephone functions to remain in use.

Alternatively, a wireless transmission protocol, such as I.E.E.E. 802.11b, I.E.E.E. 802.11g, or Blue Tooth, may be employed. Such a feature allows for

coverage within buildings and allows for varied controls based on different floors within a building or areas in which a mobile phone may not be able to connect to a phone network. In these examples, 802.11b is a specification stating an over-the-air interface between a wireless client and a base station or between two wireless clients. This specification and 802.11g has been developed by the Institute of Electrical and Electronics Engineers (IEEE). 802.11b is also referred to as WI-FI. In this example, wireless transmission device **408** is a Blue Tooth device. This device allows for coverage within buildings and allows for varied controls based on different floors within a building or in areas where a mobile phone may not be able to connect to a phone network.

Additionally, transmission tower **410** may be used to send signals to mobile communications units **402** and **404** when they are identified as being within area **400**. Transmissions through transmission tower **410** are standard cellular transmissions. These transmissions may follow various protocols, such as, for example, code division multiple access (CDMA) or time division multiple access (TDMA). In these examples, the various signals transmitted by wireless transmission device **406** and transmission tower **410** are controlled by server **412**.

The location of the different mobile communications units may be identified through GPS systems or triangulation processes based on the strengths of radio signals from mobile communications units **402**, **404**, and **406**. The triangulation process uses signals from

multiple transmission towers, such as transmission tower **410**. Alternatively, in the illustrative examples, determining the location of the mobile communications units is unnecessary if wireless transmission device **408** is used because the coverage of this transmission device affects any mobile device receiving the signals. As illustrated, mobile communications unit **402** and mobile communications unit **404** receive signals from wireless transmission device **408**, while mobile communications unit **406** does not receive the transmission of these signals. Thus, the coverage is limited by the range of wireless transmission device **408**.

The mechanism of the present invention allows for limiting the camera functions of a camera phone while the mobile communications unit is within a secure area, such as area **400**. The location of mobile communications units may be based on any location method, such as GPS or triangulation. Alternatively, a wireless transmission system, such as Blue Tooth, may be employed to limit camera functions in a mobile communications unit, such as a camera phone.

Examples of functions that may be limited or controlled in the camera phone include the total operation of the camera functions, limiting digital picture resolution, limiting an ability to record audio, limiting an ability to record digital video, and limiting the use of a flash on the camera phone.

Additionally, the mechanism of the present invention may be used to provide picture information distribution based on location. For example, in a public

entertainment site in which people may walk around and take pictures, picture information may be sent to camera phones at the entertainment site, concerning locations that are optimal for taking pictures. Further, picture information may be sent to control the operation of the camera phone for taking optimal pictures. These sites may include, for example, museums and theme parks.

Further, an entertainment site may be a commercial site, which sells digital pictures and downloads those pictures directly to a user's camera phone. For example, if a person with a camera phone walks up to a painting in a museum, the camera phone may be disabled to prevent the user from taking a picture of the painting. An offer may be presented on the display of the camera phone for a picture of the painting in which the picture is downloaded to the user's camera phone for a fee.

Turning now to **Figure 5**, a flowchart of a process for managing camera functions in a camera phone is depicted in accordance with a preferred embodiment of the present invention. The process illustrated in **Figure 5** may be implemented in a server, such as server **410** in **Figure 4**. The processes illustrated in this example are implemented using a transmission tower after locating a mobile communications unit.

The process begins by identifying the location of the mobile communications unit (step **500**). The location of the mobile communications unit may be identified through various mechanisms, such as using a GPS system or triangulation of the signal from the mobile communications unit. Next, a determination is made as to

whether the mobile communications unit is in a secure area (step **502**). If the mobile communications unit is not in a secure area, the process returns to step **500**.

Otherwise, a command is sent to disable camera functions in the mobile communications unit (step **504**). The disablement of camera functions affect a particular function or all of the functions of the camera portion of the camera phone. For example, flash photography may be prohibited within the secure area. In this case, only the flash function of the camera phone is disabled. In other illustrative examples, the resolution of the camera phone may be limited or all of the functionality of the camera portion of the camera phone may be limited.

Next, the location of the mobile communications unit is identified (step **506**). A determination is made as to whether the mobile communications unit is still present in the secure area (step **508**). If the mobile communications unit remains in the secure area, the process returns to step **506**. Otherwise, a command is sent to enable the camera function (step **510**) with the process then returning to step **500** as described above.

Turning next to **Figure 6**, a flowchart of a process for sending picture information to a mobile communications unit is depicted in accordance with a preferred embodiment of the present invention. The process illustrated in **Figure 6** may be implemented in a server, such as server **410** in **Figure 4**.

The process begins by identifying the location of the mobile communications unit (step **600**). A determination is then made as to whether the mobile

communications unit is within a distribution site (step **602**). In these examples, a distribution site is a location that has been defined as one in which picture information is to be sent to mobile communications units for the purpose of providing information for taking pictures. If the mobile communications unit is not within a distribution site, the process returns to step **600**.

Otherwise, picture information for the distribution site is identified (step **604**). This picture information may include an identification of locations for taking pictures. Further, this information may include maps for display on the mobile communications unit. Further, different camera settings for optimal picture taking also may be presented to the user. Additionally, depending on the particular implementation, camera settings may be sent directly to the camera phone to automatically set the camera phone for the user to take optimal pictures. Next, the camera information is sent to the mobile communications unit (step **606**) with the process terminating thereafter.

Turning next to **Figure 7**, a flowchart of a process for sending pictures to a mobile communications unit is depicted in accordance with a preferred embodiment of the present invention. The process illustrated in **Figure 7** may be implemented in a server, such as server **410** in **Figure 4**. The process illustrated in **Figure 7** is employed to send pictures to a camera unit in exchange for a fee when the camera phone is located within a selected location.

The process begins by identifying the location of the mobile communications unit (step **700**). A determination is made as to whether the mobile communications unit is in a commercial site (step **708**). In these examples, a commercial site is a site in which one or more camera functions may be disabled. Further, in this location, pictures are made available for purchase by users of mobile communications units, such as camera phones. If the mobile communications unit is not within a commercial site, the process returns to step **700**.

Otherwise, a command is sent to the camera phone to disable camera functions (step **710**). Then, an offer for a picture is sent to the mobile communications unit (step **712**). A determination is made as to whether the offer has been accepted (step **714**). If the offer has been accepted, the picture is sent to the mobile communications unit (step **716**), and the user is billed (step **718**). Thereafter, the process terminates.

With reference again to step **714**, if the offer has not been accepted, the process terminates without transmitting a picture or billing the user.

With reference next to **Figure 8**, a flowchart of a process for disabling camera functions is depicted in accordance with a preferred embodiment of the present invention. The process illustrated in **Figure 8** may be implemented in a mobile communications unit, such as camera phone **200** in **Figure 2**.

The process begins by determining whether a command to disable camera functions has been received (step **800**).

The process continues to return to step **800** until such a command has been received. When such a command has been received, camera functions in the mobile communications unit are disabled as specified by the command (step **802**). The camera functions disabled may be all of the functions or some subset of functions, depending on the particular implementation.

Thereafter, a determination is made as to whether a command has been received to enable the camera function (step **804**). The process returns to step **804** until such a command is received. Upon receiving a command to enable camera functions, the functions are enabled (step **806**) with the process then returning to step **800** as described above.

Turning now to **Figure 9**, a flowchart of a process for handling camera functions in a camera phone is depicted in accordance with a preferred embodiment of the present invention. The process illustrated in **Figure 9** may be implemented in a mobile communications unit, such as camera phone **200** in **Figure 2**. The process in this figure illustrates steps used in handling wireless transmission signals.

The process begins by determining whether a selected command has been detected (step **900**). The process continues to return to step **900** until the selected command is detected over the wireless transmission. Upon receiving the command, camera functions are disabled (step **902**). Then, a determination is made as to whether the command is still present in the signal (step **904**). If the command is still present, the process continues to

return to step **904**. Otherwise, the camera functions are enabled (step **906**) with the process then returning to step **900**.

Turning now to **Figure 10**, a flowchart of a process for receiving picture information is depicted in accordance with a preferred embodiment of the present invention. The process illustrated in **Figure 10** may be implemented in a mobile communications unit, such as camera phone **200** in **Figure 2**.

The process begins by receiving camera information (step **1000**). A determination is made as to whether the camera information contains suggestions with respect to taking pictures (step **1002**). If the camera information contains suggestions, the suggestions are displayed on the mobile communications unit to the user (step **1004**) with the process terminating thereafter. These suggestions may be, for example, light settings, whether to use a flash, resolution or focus suggestions, or a suggestion of a location from which to take pictures.

With reference again to step **1002**, if the camera information does not take the form of suggestions, then camera settings are automatically adjusted (step **1006**) with the process terminating thereafter. In this case, the camera information is a number of settings that are sent to the camera to automatically adjust or configure the camera for taking pictures at the particular location.

A software communications protocol and device functions protocol is employed to allow for control of the camera. Current protocols may be used with additional

commands being added to those to allow for control of camera functions.

Turning next to **Figure 11**, a flowchart of a process for receiving pictures in a secure area is depicted in accordance with a preferred embodiment of the present invention. The process illustrated in **Figure 11** may be implemented in a mobile communications unit, such as camera phone **200** in **Figure 2**.

The process begins by receiving a command to disable camera phones and to display an offer (step **1100**). Thereafter, camera functions are disabled (step **1102**). The offer is displayed to the user (step **1104**). A determination is then made as to whether the offer is accepted (step **1106**). If the offer is not accepted, the process terminates. Acceptance of the offer results in the picture being received at the camera phone (step **1108**) with the process terminating thereafter.

In this manner, the present invention provides an improved method, apparatus, and computer instructions for managing camera functions in a mobile communications unit such as a camera phone. The mechanism of the present invention allows for one or more camera functions in a camera phone to be selectively turned off or limited while allowing telephone or other communication functions to continue to operate. In this manner, areas in which photography may be limited may be controlled while allowing the user to continue to carry the camera phone. Further, this mechanism also may be used to provide picture information for taking of pictures to a user with the camera phone. Also, the mechanism of the present

invention may be employed to sell digital pictures to camera phone users at certain locations, such as a museum or art exhibit.

The mechanism of the present invention identifies the overall position of the device using GPS or triangulation. This location method is especially useful in outdoor areas, such as outdoor concerts or arenas.

It is important to note that while the present invention has been described in the context of a fully functioning data processing system, those of ordinary skill in the art will appreciate that the processes of the present invention are capable of being distributed in the form of a computer readable medium of instructions and a variety of forms and that the present invention applies equally regardless of the particular type of signal bearing media actually used to carry out the distribution. Examples of computer readable media include recordable-type media, such as a floppy disk, a hard disk drive, a RAM, CD-ROMs, DVD-ROMs, and transmission-type media, such as digital and analog communications links, wired or wireless communications links using transmission forms, such as, for example, radio frequency and light wave transmissions. The computer readable media may take the form of coded formats that are decoded for actual use in a particular data processing system.

The description of the present invention has been presented for purposes of illustration and description, and is not intended to be exhaustive or limited to the invention in the form disclosed. Many modifications and

variations will be apparent to those of ordinary skill in the art. For example, the mobile communications units in with disabled camera functions are camera phones in the depicted examples. The mechanism of the present invention also may be applied to other types of mobile communications units with camera functions. For example, a personal digital assistant with a camera may be controlled in a similar fashion if the PDA includes a wireless communications unit. In some cases, the PDA may not provide for voice communications, but may be controlled in a fashion similar to the camera phones described above. The embodiment was chosen and described in order to best explain the principles of the invention, the practical application, and to enable others of ordinary skill in the art to understand the invention for various embodiments with various modifications as are suited to the particular use contemplated.